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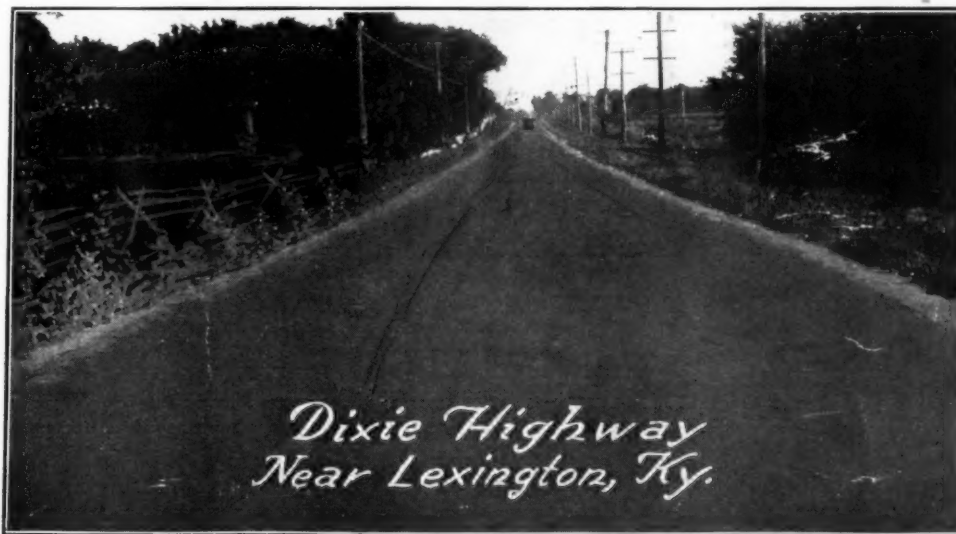
VOLUME XLVIII
No. 1

New York, January 3-10, 1920

Weekly—\$3.00 a Year
10 Cents a Copy

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Published Weekly by MUNICIPAL JOURNAL & ENGINEER, INC., at 243 West 39th Street, New York
S. H. HUME, President J. T. MORRIS, Treasurer A. PRESCOTT FOLWELL, Secretary

Vol. XLVIII.

NEW YORK, JANUARY 3 and 10, 1920

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Subscription Rates

United States and Possessions, Mexico and Cuba.....\$3.00 per year
All other countries.....\$4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at
New York, N. Y., under the Act of Congress of March 3, 1879.

Change of Address

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Telephone (New York): Bryant 9591
Western Office: Monadnock Block, Chicago

A. PRESCOTT FOLWELL, Editor
SIMON BARR, Assistant Editor

Contributed Articles and Reports

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.

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OUR COMBINED ISSUES.

In spite of efforts made during the past month to catch up with our publication schedule, which the printers' strike had interrupted, the printers have found it physically impossible to do so, the holiday season adding to the difficulty. We therefore decided that the only course possible was to combine issues, publishing each week as many pages as the printers could handle. The four December issues were accordingly combined in one published last week, to finish the volume; and in this issue are combined the first two of the new volume. We hope, following this number, to issue the paper regularly on the publication date.

HOW ABOUT THE 1920 IMPROVEMENTS?

From two months to two years are required for deciding upon and preparing a well-digested and satisfactory plan for any engineering work. At least one or two months are necessary for advertising and letting, and an equal time for the contractor to make his preparations for beginning work. And ground should be broken by April 1st if the job is of any size. This brings us back to December 1st as the latest date for getting started on even a small municipal job.

One month gone already! Have proceedings been begun on all of your next season's improvements?

CONTRACTORS' REPUTATIONS AND AWARDING CONTRACTS.

"Attract to your work strong contracting concerns with ample capital and equipment resource to insure completion of your program. I think we will all admit that the effect would be disastrous if contracts were awarded in large numbers to the contractors without further investigation on our part than to satisfy ourselves that they could furnish a bond. The tearing up of roads and the dragging along of work in a listless manner, on account of financial or other reasons, to the great annoyance and inconvenience of the public, is more than any organization, no matter how well-meaning, could survive. Before work is awarded, the contractor's responsibility should be established through presentation of his financial statements and assurances from banking institutions indicating their willingness to extend him assistance, if need be, to finance the work. This data should also be accompanied by records of his previous performance in contract work."

In the above, referring to state highway work, George H. Biles, assistant state highway commissioner of Pennsylvania, supports the opinion that we have advanced repeatedly for several years past, that in the selection of a contractor for public work more than the figures of his bid should be taken into account. His experience

and reputation should be an equally important consideration; for it is essential not only that public work be done, but also that it be done well and without delays and with a minimum of discord.

SOME STANDARD PRACTICES OF WAR-TIME SEWERAGE.

Twenty years ago, when the editor of this paper wrote the first edition of "Sewerage," he included in this and advocated the adoption of several features which at that time were by means common practice, although he did not claim to be the originator of their general principles. Among these were the "rational" method of calculating run-off to storm sewers, the substitution of plain storm-water inlets for catch-basins except under special conditions, and the ventilating of house sewers through the house connections by the omission of running traps. At that time the majority of engineers were, we believe, either actively or passively opposed to these ideas and practices, and illustrations of them in actual municipal practice were few and far between.

It is therefore with considerable gratification that we note that, in the plans prepared by the experts selected by the Federal Government for designing the sewerage of the various camps, cantonments, aviation stations, etc., all employed the rational method of run-off calculation, and the majority, we believe, also included the other two ideas in their general plans.

The rational method of calculating run-off was first given prominence by the late Emil Kuichling, to whom the author of "Sewerage" was indebted for the basis of his discussion of this subject. At the present time there appear to be few engineers or municipal sewer departments which offer any excuse for not using this method except the one that it requires much more figuring than the use of some standard formula, and that the formulas are sufficiently exact for their purpose; which latter statement we beg to question.

In the matter of ventilating through house connections, this is more or less generally opposed by plumbers, but where engineers have interested themselves in the matter we believe they have generally reached the conclusion that it is advisable, and the practice is growing in this country. In England it has for years been the practice to use a contrivance much more elaborate than our running traps and there might perhaps be more argument for its use because of the foulness of the old English sewers; but even there, there have been for some time advocates of the ventilation of sewers through the house connections and during the past year the advocates have increased considerably in number and in persistence.

In the matter of inlets versus catch-basins there is still far from a consensus of opinion. The reason for this probably is that there are some locations and conditions where catch-basins are undoubtedly desirable, and it is easier in a large city, where most details are standardized as much as possible, to provide catch-basins everywhere than to endeavor to determine for each case whether or not an inlet would not be preferable. On this point we have commented at greater or less length in Municipal Journal from time to time in the past.

In general, we believe that the engineering profession can be congratulated on the planning and construction of the sewerage systems of the various war-time housing projects, including the cantonments. In spite of the urgency and feverish haste with which the plans were prepared and their construction carried out, both plans and construction show few things which the calmer scrutiny of the months following the termination of hostilities can find fault with.

Sub-Contracting Highway Work.

Elsewhere in this issue will be found an article presenting arguments in favor of permitting contractors to sublet portions of their work, special reference being made to highway work. It has for a great many years been the practice of engineers to insert in their contracts a clause forbidding the subletting of the work without the express consent of the party of the first part. There undoubtedly have been in the past unfortunate experiences with sub-contracts and sub-contractors which gave rise to the general inclusion of such a clause, but, as Mr. Hauer says in this article, times have greatly changed and methods should change with them.

Billions of dollars are available for highway work in this country, and the problem for the next few years will be getting the work done rather than paying for it. This can be done by letting many thousands of small contracts or by letting a small percentage of this number of large ones. In spite of any difficulties that may possibly arise through sub-contracting, it would seem almost certain that public authorities letting these contracts will not only secure better work, but also will encounter less difficulty and annoyance, by letting it in a comparatively small number of large contracts rather than the reverse. The large contractor will generally have more complete and adequate equipment for doing first-class work, he will be less likely to be financially incompetent and throw up the work before it is completed, he will generally be found more responsible when it comes to enforcing maintenance clauses or will have a more real consideration for the reputation which he is establishing by the character of the work which he performs, and in many ways the dealings with one large contractor carefully selected will be found more advantageous than with a number of small contractors of all degrees of efficiency and reliability.

This does not necessarily mean, and in all probability would not mean, that small contractors of fair ability would be unable to obtain work. If the contract permits the big contractor to sublet sections of the work, in the majority of cases he will do so, allowing these small contractors to take over the sub-contracts. Nor does this necessarily mean that the sub-contractor would not make as large profits as though he contracted directly with the highway authorities.

There is still another point and one which is too often overlooked. In a great many cases only the bid of the contractor is considered in awarding the contract, and if this is low and the bond is satisfactory, he gets the work. In many cases, however, the contractor has had no previous experience in this kind of work and may be unable, with the best of intentions, to do a good job. Or he may leave both his bondsmen and the party of the first part in the lurch to complete the job, and even though the bondsmen may make good, there is still the annoyance and delay and frequently a loss of unrecoverable expenses which could have been avoided by refusal to give the contract to any but an experienced and reliable contractor. A large contractor is in most cases more competent to determine the qualifications of these smaller contractors than is the party of the first part, with the result that the work is done better and with less friction under the sub-contract than it would have been by another small contractor who might have been given the job as a principal.

Altogether, there seem to be so many arguments in favor of permitting sub-contracting on large highway work that we recommend careful consideration of the idea of granting permission to sublet in future contracts.

St. Louis Water Purification Plant Operation

Increased cost of labor and materials raised cost of treatment to \$9.10 per million gallons. Nearly nineteen thousand tons of chemicals were used in treating thirty-seven billion gallons, from which 373,321 tons of solids were removed. Taste was removed by use of copper sulphate. Many parts of the plant were corroded by chemicals, and were renewed in some cases with different materials. Pipes and venturi meters were cleaned of deposits.

Operating and maintaining the Water Division of St. Louis during the year ending April 1st, 1919, cost \$1,650,929, exclusive of the expenditures for additions, improvements and extensions, work done outside the department proper, and war protection. This was \$218,108 greater than during the previous year, although the consumption was about four million gallons per day less. There was an increase of \$130,615 for salaries and wages, \$40,612 for chemicals, and \$49,235 for coal.

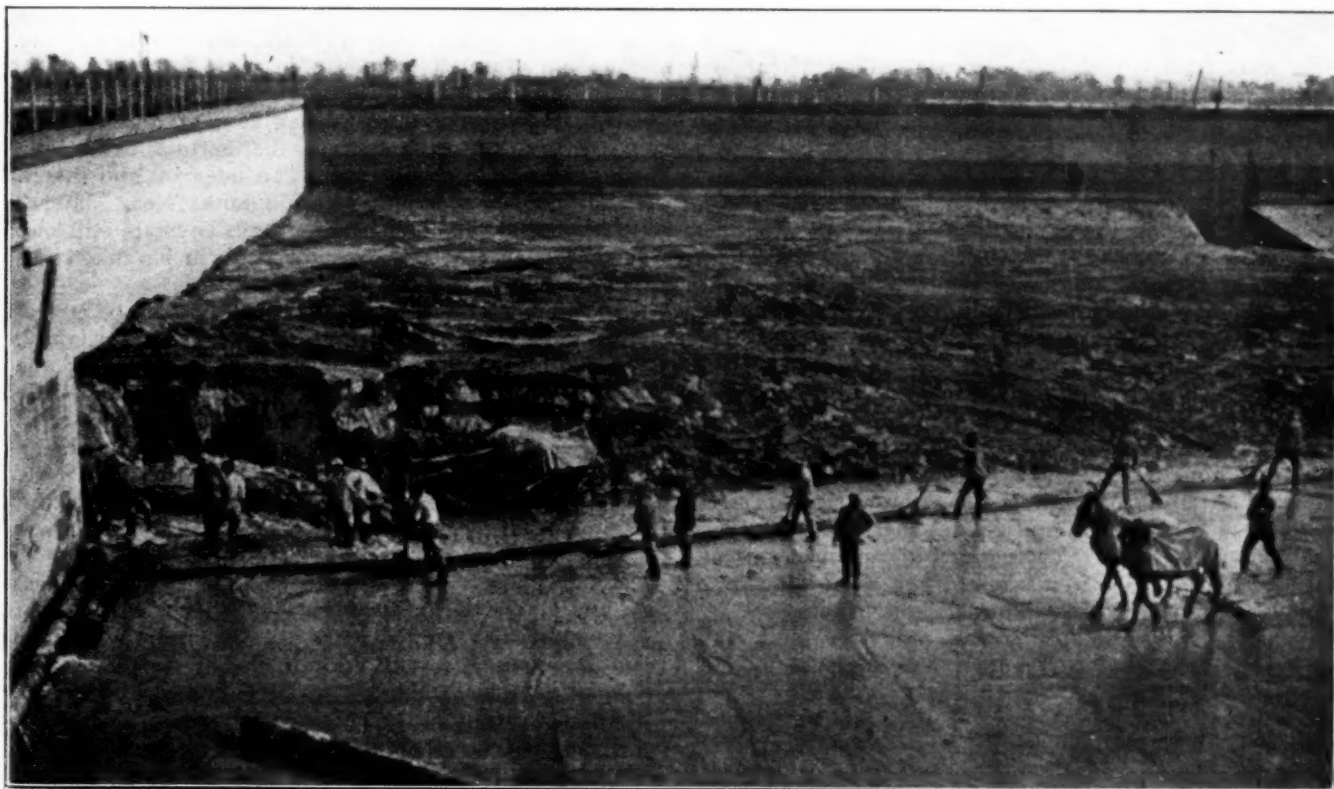
PURIFICATION COSTS AND RESULTS.

The amount of water pumped into the basins of the purification plant was 37,751 million gallons, and 36,840 was delivered for consumption. In treating this water there were added to it 14,999 tons of lime and 1,781 tons of sulphate of iron in the basins, and 1,790 tons of sulphate of alumina and 83,160 pounds of chlorine at

the filtration plant. The average rates of application were 0.66 grain of sulphate of iron, 5.56 grains of lime and 0.66 grain of sulphate of alumina per gallon, and 2.21 pounds of chlorine per million gallons.

The chemicals alone cost \$3.72 per million gallons for lime, \$0.82 for iron sulphate, \$1.37 for sulphate of alumina, and \$0.31 for chlorine. The total cost of chemicals at the basins was \$4.54 per million gallons, other expenses in connection with this part of purification bringing the total cost to \$6.00. Filtration cost \$3.10, of which \$1.68 was for chemicals. Pumping cost \$13.17 a million gallons.

During the year the plant removed from the water 359,323 tons of suspended matter, 13,998 tons of dissolved matter, and 27,290 tons of coagulants precipitated as calcium carbonate, ferric hydroxide and aluminum



CLEANING BASIN NO. 9, ST. LOUIS WATER PURIFICATION PLANT.
Sediment showing a maximum depth of 10 to 12 feet.

hydroxide. Of the suspended matter, 116,456 tons, or 172,530 cubic yards were removed by the grit chamber, or 32 per cent of that present in the river water. Over half of this was fine enough to pass a 100-mesh sieve.

All of this deposit was flushed back into the river. The periods between cleanings of the grit chamber varied from 4 to 14 days. Of the other suspended matter, collected in the basins, about 127,000 tons was removed by laborers and teams and the remainder was flushed out through the sewer by opening the mud gates about 6 inches for a half-hour period at varying intervals. The removal by teams from the five basins cost \$2,847.67, or 1.5 cents per cubic yard.

Averaging the results for the year, the hardness was reduced from 183 in the river to 101 in the mains. The total bacteria on gelatin averaged 43,500 in the river, 1,160 after settling, 830 as applied to the filters, and 200 after filtration; the corresponding figures on agar being 9,160, 75, 46, 12, and 9. The number of B. Coli per c.c. averaged 37 in the river, 0.51 after settling, 0.36 as applied to the filters, 0.048 after filtration, and 0.01 on entering the mains.

TASTE IN THE WATER.

As usual, there was trouble with organisms in the Compton Hill reservoir. The circulation of the water is limited to a small part of the basins, which causes "dead" spots in which the organisms collect and thrive.

The south basin at Compton Hill was treated three times with copper sulphate during the summer and was emptied and cleaned once. The north basin was treated twice with copper sulphate. The organisms reached a maximum of 2,000 per cubic centimeter in September. Diatoms were the organisms found in greatest number. The crustacea, moina and cyclops were the principal macroscopic organisms found.

Complaints of bad taste were received at two times during the year. In June complaints of a grassy or fishy taste were received. Most of these complaints were from people who were being supplied water from Compton Hill. At that time there were 1,400 organisms per cubic centimeter in the Compton Hill water. The basins were treated with 0.52 part per million of copper sulphate and the number of organisms dropped to 150 per cubic centimeter and no more complaints were received.

On November 30th the taste of the water was variously described as "ammonia, carbolic acid or medicine" by the people making the complaints. The taste was due to the action of chlorine upon the organic matter present in the water at that time, but was not due to the excessive use of chlorine or to the presence of free chlorine in the water.

SUMMARY OF OPERATION.

During the year 37,675 million gallons of water were filtered at a cost of \$3.10 per million gallons. The forty filters were continually in service, except for short periods of time when minor repairs were being made. The rate of filtration during the year varied from a maximum of 124.44 million gallons per acre per day to a minimum of 31.11, averaging 80.57 million gallons per acre per day. The maximum run of a filter was 225 hours, filtering 23.58 million gallons; the minimum run was 16.90 hours, filtering 1.97 million gallons, and the average run was 59.8 hours, filtering 6.46 million gallons.

The forty filters were washed a total of 5,828 times, using 498 million gallons of water, or 1.32 per cent of the water filtered.

During the year 1,790 tons of aluminum sulphate have been used. Of this amount 1,749 tons were added to

the settled water and 41 tons to the applied water at the influent pipe to each filter after washing. None was used at the influent flume at the north or south ends of the filter plant. The charge of aluminum sulphate to the settled water has varied from a maximum of 2.12 grains per gallon to a minimum of 0.23 grains, the average being 0.65 grains per gallon of water filtered.

A total of 83,160 pounds of chlorine has been added to the filtered water, the maximum charge being 4 pounds per million gallons, the minimum 0 and the average 2.208 pounds per million gallons of water filtered.

In order to obtain information on the increased coating of the sand grains during the past two years a vertical section of the sand bed was collected from one of the filters after washing and divided into horizontal layers. Treatment of each layer with hydrochloric acid was followed by a thorough washing with water. The per cent loss due to the acid treatment varied from 14 in the top inch to 3.3 at 22 inches from the surface. Two years ago the losses at the same depths were 9.8 per cent and 1.13 per cent respectively.

CORROSION FROM CHEMICALS.

August V. Graf, the chief chemist, reported: "The north lime line is in bad condition. The south line has been taken up, cleaned and relaid on a gradual upward slope from the coagulant house to the mixing chamber. The line will be cleaned at frequent intervals by forcing a mechanical cleaner through the pipe. This line was cemented at the joints and it is expected will develop fewer leaks than the old line, which was leaded at the joints."

Corrosion by chemicals has been found troublesome in many parts of the purification plant. August G. Nolte, superintendent of the filter plant, gives the following description of these troubles and the remedies applied:

"The concrete sulphate dissolving boxes in the chemical room have again been resurfaced with cement mortar and coated with asphalt. The copper screens in the dissolving boxes are rapidly deteriorating and are not worth repairing so they are being replaced with boards drilled full of holes; these answer every purpose of the screens and are easily removed.

"The surface of the bottom of the solution tanks is becoming more and more raveled so that it will probably be advisable to resurface the bottom of all the tanks during the coming year. The sides are still intact.

"The agitator shafts in solution tanks Nos. 1 and 2 have been renewed during the year. There is still one tank, No. 4, that has the original shaft in it; this, however, will have to be replaced shortly.

"Many of the 3-inch gate valves around the chemical pumps and solution tanks are again leaking slightly. They were repaired about a year ago. This leakage causes no waste but makes handling the solution a little inconvenient. A blank lead flange has been inserted beyond each sewer valve from the solution tanks so as to insure no waste from that source. As it is only necessary to flush the tanks about once every two months, the removal of the blank flanges does not consume much time.

"Bronze gate valves, around the aluminum sulphate solution, operated as frequently as they are, will not hold up for any length of time. Any attempt to keep them leak proof would mean constant repairing. So as long as their leaking does not interfere with the proper application of the sulphate solution and does not cause any waste of solution it is better to tolerate a little leak rather than make constant repairs.

"The vertical agitator motors in the chemical room have been taken apart and the parts bathed in gasoline.

These motors are subject to much dust and so canvas hoods have been made to protect them.

"The 4-inch lead solution lines through which the aluminum sulphate solution is conveyed to the point of application has been cleaned several times. Instead of pulling a 4-inch leather disc through as was formerly done and which meant disconnecting a line about every 60 feet, we now use a double rubber disc and shoot it through with water pressure. This only necessitates disconnecting an entire line, about 800 feet in length, at two places. The disc will pass around bends of 3-foot radius and through the 4-inch open gate valves on the line. The water pressure required to shoot the disc has averaged from 20 to 50 pounds per square inch. No bulging whatever has resulted from this pressure. With this disc the work of cleaning is done much more thoroughly than by hand, in about one-third the time, and is really a protection to the pipe since it eliminates disconnecting and thereby preserving the peened gaskets.

"The 1¼-inch brass cocks on the 1¼-inch lead solution line to the influent of each filter have been reground several times during the year. When these need replacement globe valves should be substituted.

"The bronze orifice castings in the orifice boxes of the automatic chemical meters and the conical plugs that regulate the area of the outlet have had to be repaired on account of the corrosive action of the sulphate on these parts. The bronze orifice casting was turned out about ¾ inch and an orifice bushing made that would screw into the casting so that hereafter the bushing, when deteriorated, may easily be replaced. The plugs were turned down and polished. Since these repairs were made the automatic control properly regulates the amount of solution to be fed in proportion to the amount of water passing through the 8-foot meters.

"Last July the three 4-inch venturi meters at the north end of the plant used for measuring the amount of aluminum sulphate applied to the settled water were taken apart and cleaned. The meters were so badly clogged with scale from the alum solution that the diameter at the head was reduced from 4 inches to 3 inches and at the throat from 1½ to 1⅜ inches. Before cleaning, the meters recorded and indicated about 30 per cent too fast. After cleaning the variation was only 1 per cent. We have made it a practice now to leave the meters disconnected when not in service because we have found that solution standing quietly in a meter deposits scale much more rapidly than when in motion.

"The 4-inch tile pipe chlorine line laid as an experiment to convey the chlorinated water to the drawing conduit chamber had to be abandoned on May 20, 1918, on account of the excessive leakage from it. There was

some leakage at the litharge joints but the greatest leakage occurred through the body of the pipe itself."

Sub-Contracts on Road Construction*

By Daniel J. Hauer.

The author presents arguments in favor of letting road work in large contracts, and permitting the contractor to sublet whatever he may wish, holding him responsible for results.

Under the caption, "Two Cooks or One?" A. N. Johnson in the September issue of *Successful Methods* opens up an interesting discussion of letting contracts for highway improvement. No one is better fitted than Mr. Johnson to speak for engineers upon any highway problem, but naturally he approaches the subject from an engineer's viewpoint and he gives a symposium from the leading highway engineers of the country, that must have entailed much labor to obtain. His deductions and recommendations are along good practice, but it seems well to present the contractor's viewpoint and to call attention to some of the inconsistencies that are to be found in the views of some of the engineers quoted, and especially in the construction specifications of a great number of state highway departments.

Mr. Johnson points out the need of attracting the well-established contractors to the highway field. This is advisable, but one evil in letting contracts should first be eliminated, namely the small contract. One reason in the past for small contracts has been the desire to have some road improvements made in every village and district. As a result in nearly every county and state there are many short sections of improved roads fast going to pieces.

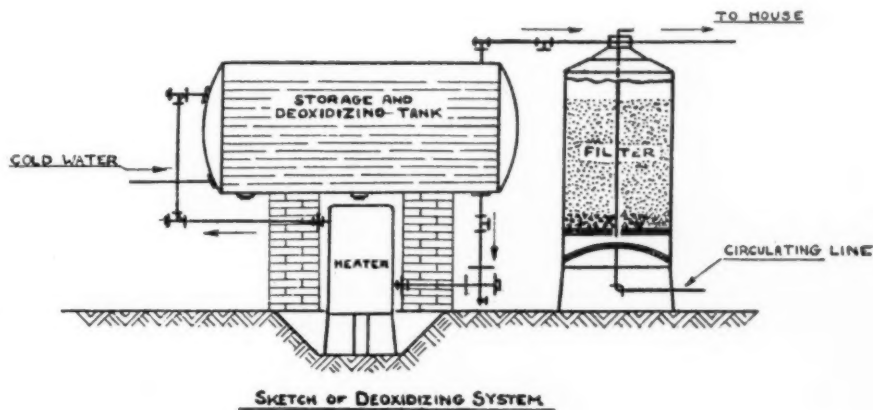
LET LARGE CONTRACTS.

To build a mile of road a contractor must have some type of excavating machine, horses and wagons, a fleet of motor trucks, rollers, concrete mixers, levelers, drags, finishing machines, unloading apparatus, possibly crushers and sand and gravel washers, perhaps an asphalt plant, and many other tools and appliances. Without an ample modern plant he cannot hope to obtain contracts or

*From "Successful Methods" for December, 1919.

Prevention and Cure of "Red Water."

Under this title we published an article in the issue of November 22 describing a process for deoxidizing water with that end in view. This illustration of the apparatus should have accompanied the article, but the drawing was not received in time.



do them economically. The same plant that may be employed for a few weeks or months on a short contract will build ten miles or more of road in a season. To put it in other words, a contract for \$20,000 worth of road construction may require \$30,000 worth of plant, although the value of the plant may not have to be increased more than ten or fifteen per cent to do a \$250,000 contract.

Occasionally a short or small contract may be necessary, but with millions to expend and hundreds of miles to build, contracts should be of such size as to assure economical construction.

PROHIBITING SUB-LETTING.

A contractor undertaking a large contract will wish to complete it both quickly and economically. In some cases this means placing his own forces and equipment upon the job and doing other parts by means of subcontractors. Immediately he is confronted by a provision of the specifications reading as follows:

The contractor shall not sublet, sell, transfer, assign or otherwise dispose of the contract or any portion thereof or of the work provided for therein, to any person or corporation without the written consent of the state highway engineer.

This certainly is drastic, for such written consent is seldom obtained. Contrast this with a provision taken from a set of railroad specifications.

Subletting of any part of the work under this contract can be done by and with the approval of the chief engineer.

They do not seem dissimilar, but one clause is meant to prevent subcontracting, the other to encourage it, as the writer has learned from experience.

One engineer wrote to Mr. Johnson, "What I believe would be productive of the best results would be to specify that the grading and drainage work could be sublet to other contractors and to encourage rather than discourage, as is done at present, the matter of subletting a portion of the work."

In spite of this opinion, this engineer's specification, revised only last year, contains a clause regarding subletting very similar to the one quoted. He has also inserted in his revised specifications this clause:

At no time during the prosecution of the work shall more than four blocks or squares, or in open country more than one-half mile of roadway, be under construction or obstructed to traffic without permission. The laying of the surface course or pavement shall follow the completion of the base course as closely as may be required by the engineer.

Another engineer limits the grading work to at least a quarter of a mile from laying of the pavement, while still another specifies that the subgrade must be finished for at least 200 feet ahead of the pavement, but does not limit the distance it can be carried ahead, yet the writer is told that the highway commission controls the situation by curtailing the monthly estimates on grading done a few thousand feet ahead of the pavement.

It is well enough for engineers to theorize and make suggestions and give their opinion as to successful methods, but practice is the essential, and one step ahead is to change contract forms and specifications so as to obtain economical results. Railroad companies and other private corporations have used and developed subcontracting to their own benefit, and it is time for our road engineers and commissions to learn from others.

MODERN SPECIFICATIONS FOR MODERN CONDITIONS.

The next step after increasing the size of the contract is to allow the successful contractor to use his discre-

tion in subletting the work. This means that engineers must make their specifications modern and considerably more business-like than at present.

With these two things accomplished, contractors themselves will solve the problems. Regrading and resurfacing jobs, when the excavation is slight, would no doubt be done by the paving contractor. To limit the amount of road that can be torn up at one time for this class of work is not unreasonable, but no limit should be set for new road work, cut-offs, new alignments or heavy mountain roads.

Should engineers and road commissions desire to let the grading separately so as to have it done a season ahead of the paving, they can make the excavation and drainage one contract, to be followed later by a paving contract, or the entire work can be let at one time and the successful contractors either can sublet the grading, or, if they wish to do this part themselves, can sublet the paving.

Another method is to write bids on the combined work or on each class of work separately. As this is being written, a county in a southern state having \$2,000,000 to expend, is inviting bids on grading and paving, on grading alone, on culverts and bridge work alone, and on paving alone. A request also is made for bids on a minimum of three miles of highway with the privilege of taking as many additional miles as a contractor feels he can handle. This method, brought forth by a desire to contract for the road construction under satisfactory prices and conditions, should attract bids at reasonable prices.

The solution of the problem is to let large contracts with the right to sublet. Then the contractor with strong financial backing and a large organization with ample equipment, will make use of the smaller contractor in whatever place he sees fit. He may let the grading to one subcontractor and to others the culverts and bridges and possibly some of the paving.

The answer in most case would be "one cook" who would make bond, have ample capital, and through his own organization and that of his subcontractors would control large forces of skilled workmen and plenty of machinery. Even with half a dozen contractors, the management of the work would be under one man, which would avoid delays and the conflicts that may arise between different contractors on the same work.

WORK FOR BOTH SMALL CONTRACTORS AND LARGE CONTRACTING ORGANIZATIONS.

Many contractors, who may not have cash to put up certified checks for bidding or who would have difficulty in obtaining bond for a large job and yet have sufficient capital and plant and possess the experience and skill to do first-class work, can be used by the general contractor as subs. With their own money and plant at stake they will do the work cheaper and better than it is likely to be done by a superintendent of the general contractor.

This method will make available large contracting organizations throughout the country, as well as hosts of local contractors, equipped to do grading, masonry, paving, clearing, fencing and other classes of construction.

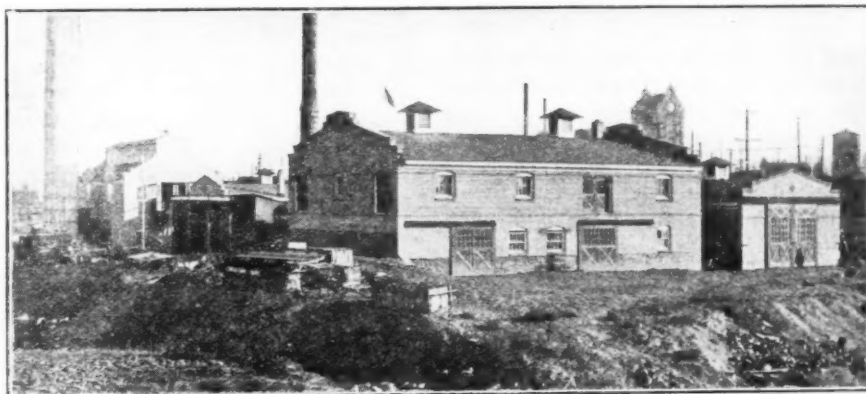
The experience of the past in road building should not be the criterion for the present or future. Conditions have changed, the public voting vast sums and demanding that roads be built quickly and cheaply with this public money. Commissioners and engineers must understand these changed conditions and meet the problems. The methods of the past must go.

Landscape Gardening at Spokane Incinerator

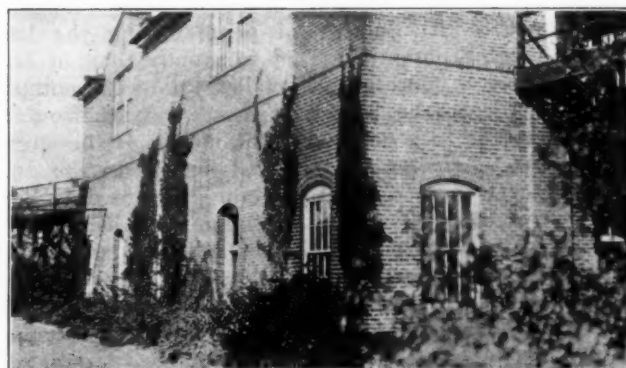
Under the title "A Garbage Crematory with Self-respect," Arthur E. Peterson, superintendent of the Crematory Division of the Department of Public Works of Spokane, described in our issue of March 15th, 1919, the improvements planned for giving an attractive ap-

pearance to the buildings and grounds of the municipal crematory. Planting of shrubbery was begun a year ago last spring, and the great improvement already made is indicated (but not fully brought out, we believe) by the accompanying photographs taken last summer.

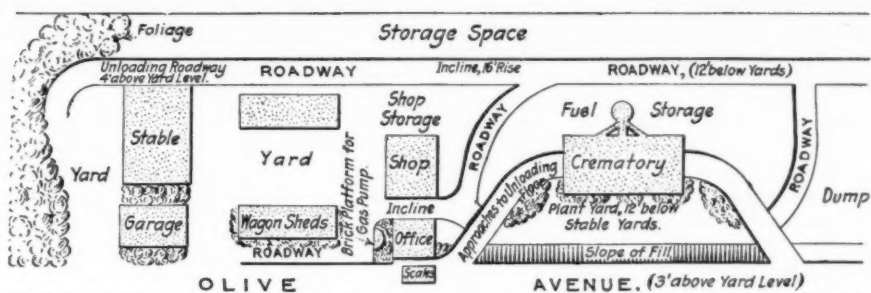
THE ILLUSTRATION AT THE RIGHT SHOWS A VIEW OF THE PLANT IN MARCH, 1918, TAKEN FROM THE UPPER LEFT-HAND CORNER OF THE SKETCH OF THE GROUNDS SHOWN BELOW, THE STABLE BEING IN THE CENTER, THE CREMATORY BUILDING AT THE EXTREME LEFT.



THE LEFT-HAND PHOTOGRAPH, SECOND LINE, SHOWS THE USE OF SHRUBBERY FOR SCREENING THE APPROACH TO THE UNLOADING FLOOR. THIS IS THE LEFT-HAND FRONT CORNER OF THE CREMATORY. THE RIGHT-HAND PHOTOGRAPH SHOWS THE RIGHT-HAND CORNER OF THAT BUILDING.



THE SKETCH AT THE RIGHT SHOWS THE PLAN FOR GRADING AND PLANTING, REPRODUCED FROM THE MARCH 15TH ISSUE. BELOW IS SHOWN THE OFFICE BUILDING AND AN END OF ONE OF THE WAGON SHEDS.



THE PHOTOGRAPH BELOW SHOWS THE GARAGE IN THE CENTER, THE STABLE AT THE LEFT, AND AT THE RIGHT THE FRONT OF THE BUILDINGS FACING OLIVE AVENUE, WITH THE CREMATORY AND ITS CHIMNEY IN THE CENTER BACKGROUND.



Disappearance of Floc in Filtration Plants*

By Charles H. Capen, Jr. †

In the Bridgeton, N. J., plant, under certain conditions the aluminum floc failed to form. It was found that the formation of floc could be secured by agitating the water by means of air.

The city of Bridgeton, New Jersey, which has a present population of 15,000 people, has possessed a municipal water works since the year 1873. Changes have been made at various times, both in respect to the source of supply and the buildings and equipment, and in 1911 plans were submitted to the department for a modern filtration plant. These plans were approved and the plant was completed in 1913. The daily water consumption is about 2,000,000 gallons.

The plant is located on the west bank of Cohansey creek, just northwest of the main center of the city. The original intake is situated on what is known as the "Raceway," at a point about one-half mile above the plant. This water course has been dammed up, giving access for boats and canoes to reach Tumbling Dam pond. The number of people using the latter for bathing purposes increased so rapidly that, in order to obtain water containing a smaller amount of polluting material, the intake pipe line was extended from the original intake to a point near the mouth of the stream, known as Northwest Passage, a tributary to the pond. The water is now drawn from the passage during the greater part of the year. At times of heavy rains, however, the original intake is used so as to take advantage of the extensive settling period provided by the pond, thus eliminating to a certain extent the necessity of treating a highly colored and turbid water.

At certain times, in spite of all precautions, the chemical and physical characteristics of the water are subject to sudden changes, particularly after heavy rain storms; and the color, which is always fairly high, increases, while the alkalinity, which is always low, decreases. The turbidity usually increases. When such conditions arise the disappearance of the "floc" usually follows.

CAUSE OF FLOC DISAPPEARANCE.

Experiments have been conducted by members of this department at various times and by W. Dayton Frederick, commissioner of public works of Bridgeton, who has charge of the plant, to determine the cause of the floc disappearance, and to find a remedy. The conclusion was that the water received an insufficient amount of agitation after the addition of the chemicals.

The water enters a small gate house from the 36-inch gravity influent main, and then passes through a large channel directly into the coagulation basin, and after passing through the latter goes through a pipe line onto the top of the filters. The chemicals are added in the gate house at a point just in front of the channel. Under

these conditions no agitation is provided and the mixture of the chemical solutions with the incoming water is very incomplete.

The coagulation basin has a capacity of about 140,000 gallons. The detention period is 1 hour and 40 minutes, and the average distance traveled by the water while passing through the tank is about 115 feet; so the velocity would be 0.0192 feet per second. Practically no finely divided suspended material will settle out at such a relatively high velocity without the action of a well formed floc. Up to the time of the solution of the problem, as explained later, the presence of a floc in the basin could often be observed in a sample collected below the surface, but was seldom discernible in samples collected at the surface. Under normal conditions, however, a good floc was usually visible on the top of the filters. It is necessary to have a residual floc in the water on top of the filters in order to form a mat that will assist the filters in removing the suspended material that is not taken out in the basin. When the floc disappears, a considerable portion of this solid material, in addition to a great deal of coloring matter and possibly a certain amount of free alum, passes directly through the filters.

Under normal conditions it is necessary to add soda-ash to the water to provide a sufficient amount of alkaline material to react with the alum. Whenever the abnormal conditions have occurred it has been found necessary to greatly increase the amount of soda-ash. Subsequently the alum has usually been increased but the ratio of soda-ash to alum has nearly always been kept far above normal; i. e., the normal ratio has been about 0.5 to 0.6 grain per gallon of soda-ash to each grain per gallon of alum, but the ratio at such unusual times as mentioned has been 0.8 to 1.0 grain of soda-ash to each grain of alum. In fact, a great range of ratios has been tried on each occasion and the one which apparently gave the best results at that time was finally used. Nevertheless the floc would continue to disappear and reappear at unexpected intervals for periods varying from 1 to 3 or 4 days until the water had again reached its normal state.

During a recent critical period it was observed that no floc could be found at any point in the basin while a noticeable floc was found on top of the filters. Upon going over the situation it was decided that the formation of this floc must have been due to the agitation of the water in flowing out of the basin, through the pipe, and onto the filters. Accordingly, samples of treated water were taken from the basin and some were allowed to stand while others were violently agitated for one or two minutes. After five minutes the former remained unchanged in appearance while the latter showed the presence of a heavy floc. At the end of one-half hour the floc in the latter had practically all settled out. Of course this condition was ideal, due to the method of stirring. In a basin, due to the velocity of flow, the floc would necessarily require a much greater period of time to settle out.

From the above experimental evidence the obvious conclusion was that the failure of the floc to appear in the basin was due to the lack of thorough mixing of the chemicals with the water. The commissioner was notified to this effect. After considering various methods that could be used to produce the desired effect, including baffling and mechanical agitation, it was decided that agitation should be provided by passing compressed air through the water at a point near the entrance to the coagulation basin. For this purpose an air compressor, at one time used in connection with the air-

* From "Public Health News," published by the New Jersey Department of Health.

† Assistant sanitary engineer, State Department of Health of New Jersey.

wash for the filters, was put into service by laying a 2-inch pipe line from it to the basin. This line was carried across to the middle of a concrete beam over the basin nearest the point of entrance; i. e., about 14 feet from the entrance. The pipe was then carried vertically down to a point several feet below the surface of the water and connected at that point to a horizontal cross-piece of perforated pipe extending across the basin perpendicular to the line of flow. The air compressor was then started, resulting in violent agitation of the water as it passed over the cross-piece. The appearance of a heavy floc in the water immediately followed. The floc appeared heaviest at a point about 15 feet

beyond the cross-piece and its slow settling action could be clearly followed during its entire course through the basin.

Since the installation of the agitating device, the water has already passed through one of the critical periods and no diminution in the quality of the floc took place during that time. It was, however, necessary to slightly increase the amount of chemicals in order to remove the increased color and solids satisfactorily. It is evident that a much larger percentum of the coloring and solid matter could be removed in the basin if the detention period was much greater, or the velocity much smaller.

Sewering War-Time Housing Developments

Details of designing and constructing sewerage and sewage treatment plants for the U. S. Shipping Board, the Department of Military Aeronautics, and others. Rainfall curves, run-off co-efficients, designing storm and house sewers; use of machinery in trenching; pipe laying, constructing manholes, etc. Sewage treatment; simple sedimentation tanks used generally for housing developments; Imhoff and septic tanks at aviation fields. Disinfecting effluents.

Among the papers read before the American Society for Municipal Improvements was one describing the drainage, sewerage and sewage treatment methods employed in the various emergency housing developments in connection with ship construction during the war, by C. P. Collins, engineer of sewerage and drainage for the U. S. Shipping Board; and one describing the industrial housing development of Loveland Farms, near Youngstown, O., by Morris Knowles, John M. Rice and A. O. Rose. Each of these describes at some length the sewerage methods employed, in which there were a number of points of interest.

DESIGNING STORM SEWERS.

Taking up first the standard methods developed for the emergency housing projects, it is stated that the run-off provided for by the storm sewers was calculated by the rational method. Although this method was advocated some twenty-five years ago by the late Emil Kuichling and was described at length by the editor of this journal twenty years ago in the first edition of "Sewerage" and recommended for use in preference to the simpler formulas, it has only slowly come into general use, although a considerable percentage of the cities now use it as the basis for their storm-sewer calculations.

In the work of the Emergency Fleet Corporation's housing projects, certain co-efficients of run-off (that is, percentages of the rain-fall which reach the sewer) were adopted as follows: For roofs, 100 per cent if directly connected with the sewers and 90 per cent if directly connected with the gutters. For pavements, 90 per cent if of asphalt, concrete and other dense pavements, brick, stone block, etc., with close joints; and 60 per cent if of blocks with wide joints. For roadways, 40 per cent for macadam, 30 per cent for gravel, and 25 per cent for hard earth. For sidewalks, 90 per cent for those extending to gutters and 60 per cent for those separated

from the gutters by parking. For lawns, parking and open spaces, 20 to 35 per cent. For meadows and cultivated areas, with various slopes and surface conditions, 1 to 20 per cent.

In selecting the heaviest rain-fall for which the sewers should be provided, so-called "design-curves" were employed, based on formulas for the several localities. For the vicinity of Philadelphia this curve was represented

by the formula $\frac{12.5}{\sqrt{t}}$. For Baltimore, $\frac{120}{t+20}$. For New England, there was used the Boston curve from the United States Weather Bureau records, which is $\frac{15.5}{\sqrt{t}}$.

For the middle west the published curve of Chicago, also based on the U. S. Weather Bureau records, was $\frac{120}{t+27}$.

For developments in the South the published curve of Savannah, Ga., from the records of the same bureau, was represented by $\frac{163}{t+27}$.

In designing the grades and sizes of storm sewers, a velocity of three feet per second was adopted by the engineering branch as the minimum velocity, and 12 inches as the smallest diameter for any sewer receiving rain water. The velocities and capacities were calculated by use of the Kutter formula, using a co-efficient of roughness of .013 for vitrified pipe and .015 for pipe or concrete and similar materials; vitrified pipe being used for sizes up to and including 24-inch and concrete for larger sizes.

In the case of the Loveland Farms the rainfall provided for was determined by data collected in the Pittsburgh district, and inasmuch as Pittsburgh lies in the

path of all storms following the Ohio Valley, while Youngstown is located on the outskirts of that drainage basin, the use of the Pittsburgh data would seem to be perfectly safe. The curve for ordinary storms was used, since it was believed that the possible damage and inconvenience occasioned by rare storms of greater intensity would be more than balanced by the saving in first cost and annual charges secured by building the smaller sewer.

In determining the average rain-fall co-efficient, a study was made of a typical block which indicated that the streets, roofs and walks occupied 30 per cent of the entire area, driveways 9 per cent, and grass plots and gardens the remaining 61 per cent. It was assumed that a co-efficient of 90 per cent would apply to the streets, roofs and walks, 30 to the driveways, and 15 to the grass plots and gardens; this giving an average run-off co-efficient for the entire area of 0.4. On account of the slope of the ground, it was estimated that the time of concentration of flow at inlets would be eight minutes. In both this and the emergency housing designs, the time of flow in the storm sewers was calculated from the slopes and size of the sewers. In this case also the sewer flow was calculated from Cutter's formula with a value for n of .013 for vitrified pipe and .015 for concrete.

Where property fronted on a storm sewer, roof-water connections were made to these for each house. Where there were no storm sewers, the roof water was removed by connecting the roof-water leaders with a small lateral running along the curb line and discharging into an inlet. This lateral, however, was entirely separate from the usual curb underdrain and was laid with cement joints. In certain sections near the upper ends of the sanitary sewer laterals a limited number of roof-water drains were connected to the house sewers, both to assist in flushing the upper ends of such sewers and to avoid inconvenient connections to the storm sewers.

In the emergency housing projects, storm sewers were

laid at the minimum depth which would give sufficient cover to protect the pipe; this cover varying with local conditions but being in no case less than two feet.

Local conditions, such as existing grades and kind of pavement, largely fixed the spacing of the manholes, but 400 feet was considered a maximum interval between them for storm sewers.

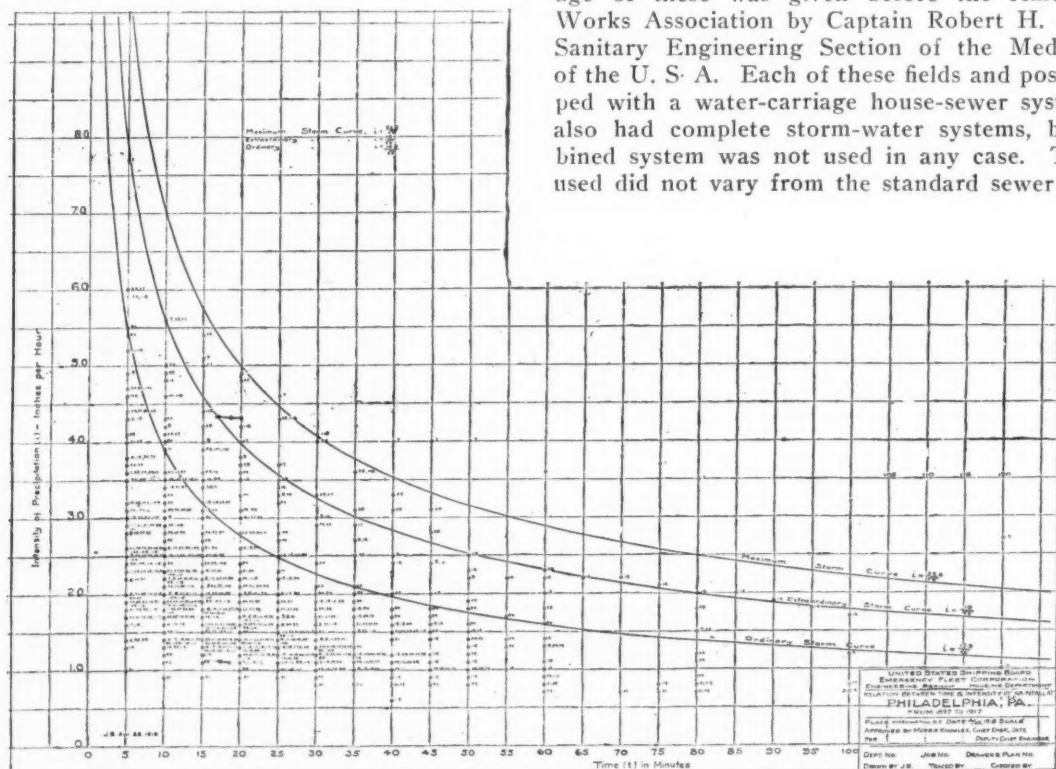
As a rule, catch basins were not used, although a few were employed in special instances. Inlets were considered preferable to catch basins for most of the developments, as catch basins are largely a source of nuisance and greatly increase the cost of maintenance.

DESIGNING HOUSE SEWERS.

In general the separate system was preferred to the combined, although the latter was approved for developments at Portsmouth, N. H., Newburgh, N. Y. and Wilmington, Del., for the reason that the combined system had already been adopted by the municipal authorities of these places and the developments could be most economically served by extending the existing systems. The separate system was adopted for the other developments, 17 in number.

In designing the house sewers for these projects, the engineering branch generally allowed for an average flow of 90 gallons per capita per day, with a maximum flow in laterals of four times the average and in mains of $2\frac{3}{4}$ times the average. The grades were required to be such as would theoretically produce a velocity of two feet per second when the sewer is running full or half full. This required a minimum grade of 0.42 per cent for 8-inch, 0.30 per cent for 10-inch and so on up to 0.08 per cent for 24-inch. At dead ends and summits, however, a grade of one per cent was required for 8-inch sewers or else a special arrangement for flushing was provided.

Still another set of government projects provided with sewerage were the aviation fields and posts, there having been established 32 regular flying fields and several smaller temporary fields and three balloon schools, together with a number of supply and repair depots and miscellaneous posts. A brief description of the sewerage of these was given before the American Water Works Association by Captain Robert H. Craig, of the Sanitary Engineering Section of the Medical Division of the U. S. A. Each of these fields and posts was equipped with a water-carriage house-sewer system. Several also had complete storm-water systems, but the combined system was not used in any case. The materials used did not vary from the standard sewer practice.



"DESIGN CURVE" FOR PHILADELPHIA DISTRICT AND DATA FROM WHICH IT WAS CALCULATED.

The grease contents of the sewage was relatively high as compared with municipal sewage, but on the average somewhat lower than that of the national army camps. The amount of sewage consumed at the various fields, was approximately the same as the amount of water, but in some cases was slightly more (probably due to infiltration of ground water through imperfect joints) and in other cases was slightly less. Much greater was the variation in per capita amounts. These varied from a minimum of 61 gallons per capita per day of sewage in Selfridge Field to 274 in Brooks Field. Of 25 fields for which the figures are available, 12 had a sewage flow of more than 100 gallons per capita and four of more than 150 gallons. The greatest infiltration of ground water was probably at Kelly No. 1, where the water consumption was 171 gallons and the sewage flow 215 gallons. The greatest difference in the other direction was at Scott, where the water consumption was 194 gallons and the sewage flow 66.6 gallons. The highest rates ordinarily occurred between six and nine o'clock in the morning and the same hours in the evening. From midnight to six in the morning the flow became almost nothing at some of the fields. Relative to the water consumption, Captain Craig said: "The quantity was abundant and was enough for all the essential needs of the posts in addition to the non-essential needs such as the sprinkling of roads and lawns, lavish use of water for bathing, etc. Water was furnished under adequate pressure with sufficient reserve equipment for fire pressure." As a result of the large consumption of water, the sewage was weak. As the sewer systems were simple and small the raw sewage as received at the treatment plants was fresh and uncommingled.

The grease problem was the real one and had not been successfully solved at the time of the signing of the armistice and not much has been accomplished since. In the original design of the field sewer systems, small cast-iron sink traps were used, these being usually augmented by an outside trap of vitrified clay pipe or cast iron. Because of the large quantities of water used in the camp kitchens, together with the small size of the traps, little opportunity was afforded for the cooling of the water and the separation of the grease. The result was that most of the grease was carried on to the sewage treatment plant. In the summer of 1918 large concrete traps, similar in design to the type adopted by the Construction Division for the National Army Camps, were installed for experimental purposes on some of the camp outfall sewer lines, but were found to be impracticable, as the grease was mixed with large amounts of fecal matter. On the other hand, the type of large concrete trap adopted by the Construction Division to collect grease from a row of kitchens has been found to be practical and to effect a high ratio of grease collection, but means must be provided for frequent removal of organic matter such as corn, peas, etc., which gathers rapidly at the bottom of the trap, and in which bacterial decomposition and putrefaction soon set in if they are not removed frequently. The grease collected was either burned or was sold along with the garbage.

CONSTRUCTION DETAILS.

Loveland Farms.—All trenches in the Loveland Farms development were opened by means of a Keystone excavator. In one section rock was encountered continuously in the bottom of trenches at a depth varying from one to five feet below the ground surface. This required extensive drilling and blasting, which allowed the machine excavation to proceed far in advance of the pipe laying. While the main trench was being excavated,

house connection trenches were opened by hand, surplus labor available at any time being used for this purpose. A combination trench was dug for sewer and water mains together, having an irregular section which, together with the many angles in the line, favored the use of the Keystone type of trencher. This type of machine was further favored for the reason that it is readily adaptable for use in lot grading or backfilling. However, the large amount of lot grading to be done required the use of a steam shovel, and an Erie shovel was used provided with I-beam trucks for support across sewer trenches. It was recognized that the shovel had disadvantages due to the distance of spoil piles from the center of the trench when operated on I-beams, and the necessary loss of time occurring at each angle of the line. However, the general utility of this equipment was held to counterbalance these disadvantages. The Keystone machine was used for backfilling most of the trenches.

With a few exceptions, all pipes were laid with cement mortar joints, this mortar being mixed in the proportions of 1 part cement to 2 parts of sand. Considerable care was given to securing good joint work, with the result that the following procedure was adopted. In making joints, a single ring of jute, soaked in cement grout, was first placed in the bottom of the bell of the pipe already laid. This jute was covered with a pad of cement mortar, filling the lower portion of the bell and extending over the edge of the bell to form a liberal ring in front of the pipe already laid. The spigot end of the following pipe was then inserted in the bell, care being taken to prevent forcing of mortar pad into the interior of the pipe. After insertion of the spigot, the ends of the jute ring were wrapped around the pipe and caulked into the bell, after which the entire joint was filled with mortar by a trowel or rubber glove. All joints were given a mortar bevel trowelled to a smooth finish. This method of forming joints eliminates the necessity for excavating bell holes and insures a full mortar joint in the lower half of the pipe.

Joints were allowed to harden slightly before back-filling, and after this hardening, loose earth, free from stone, was filled to half the height of the pipe and tamped to afford a bed for the lower portion of the sewer. A second layer of earth was then deposited to a depth of six inches above the top of the pipe and carefully tamped, after which earth filling was placed upon the pipe to a depth of 18 inches above the top by hand and the remainder of the back-fill then completed by machine, no further tamping being done.

In all pipe laying, a swab was drawn through the pipe immediately behind the pipe layers to remove all particles of mortar entering through the joint. In addition to this, the interior of the pipe was inspected with mirrors before back-filling, to insure satisfactory condition of the line.

Before final acceptance of the work, a wooden test ball, one inch smaller in diameter than the nominal size of the sewer, was flushed through all main lines. This served to remove all foreign material which had entered the line and insured freedom from clogging in the future. Where necessary, chain scrapers were used to remove hardened deposits of material which had entered the line in the course of construction.

As nearly all trenches were sufficiently dry for the use of cement joints, no special compounds for jointing in wet trench were maintained on the work. However, in some instances, springs were encountered which could not readily be drained by pumping and in these cases other means were adopted. A practice occasionally used

was that of cementing several lengths of pipe together and wiring them to planks about 12 feet in length, after which the cement joints were allowed to harden. These plank sections were then lowered into the trench and connected by means of leadite joints poured under water, leadite being used in this case as it was readily available from work on the water line.

In the manholes first constructed, adjustable forms were used to form the channels in the concrete bottoms, but considerable trouble developed in this method from the flowing of cement concrete into the pipes already laid. This method was therefore discontinued and vitrified clay pipes were laid directly through the manholes by means of specials, the concrete base being then cast around the pipe and the upper portion of the pipe being removed later to form an open channel.

Granulated slag was used extensively to provide a cushion for the bedding of pipe in the trench and was, during the winter period, extensively used for blinding, as all spoil piles were solidly frozen until late in the spring. Another difficulty in connection with winter and spring construction was the collection of considerable depth of soft, running mud in earth trenches due to the thawing of the clay banks. This mud was of such consistency that it could neither be shoveled nor pumped and resort was had in some instances to primitive bailing methods. In many such trenches it proved particularly difficult to obtain a firm foundation at the proper grade and in these instances it was found that granulated slag was particularly useful. This material, when mixed with the soft clay in the trench bottom, absorbs the water and forms a foundation equally as good as the planking.

Street inlets consisted of a circular pre-cast concrete bottom section of uniform height, with a variable height of upper circular section poured in place. The bottom section has a rounded interior, thus preventing the accumulation of sediment and being directly connected with storm sewers by a 12-inch pipe. When handled under yard conditions, it was found that the forms for these inlets showed little damage from use and that numerous pourings could be made with a single set of forms. As the distance from the invert of the inlet to the curb level varied in all instances, a variable section was cast in place as desired. The forms for this work consisted merely of circular inside and outside forms resting on the pre-cast section previously placed, the concrete being poured in connection with sidewalk or other concrete work in the vicinity.

As previously described, a limited number of houses near the upper end of each house sewer lateral were permitted to connect their roof-water leaders directly to the house sewer. In making this connection, roof water drains were tapped and vented before discharging into the house sewer, in such a manner as to prevent sewer air from following roof-water conductors to the vicinity of open windows.

Emergency Housing Projects.—Manholes in these projects were generally constructed of brick, with intervals between them not greater than 300 feet. The iron covers for the manholes were made without perforations in order to prevent the entrance of surface water, provision for ventilation being made through the house connections. Drop manholes were used as in general practice, the drop being made through the manhole where it was less than 2½ feet, but outside the manhole where the drop was 2½ feet or more.

Where the grade at dead ends could not be made as great as one per cent, flush manholes were provided.

These were constructed like an ordinary manhole and were connected with the water system by means of a galvanized pipe provided with a spigot. A shear gate with chain attached was placed at the outlet of the manhole, which allowed the manhole to be partly filled with water which, the gate being raised, provided the necessary flushing wave for cleaning the sewer. This was preferred to the automatic devices, which the engineers considered wasteful of water. Pipe joints were constructed of cement with a narrow gasket of hemp or jute, finished with a beveled outer surface; but in wet trenches where considerable ground water was encountered, an approved bituminous material or joint compound was used in place of cement mortar.

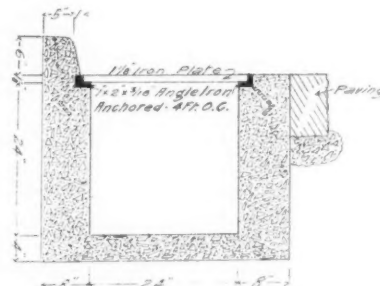
(To be continued)

Combined Sewer and Gutter

In planning a storm-water sewer in a street of West Orange, N. J., to discharge into a brook and extend for a distance of 500 feet therefrom, it was found that a house sewer in the center of the street, a water main on one side and gas main on the other, with their house connections, made it impossible to lay a storm sewer in the usual manner without placing it below the level of flood water in the brook.

To meet this condition, town engineer Chas. A. Winston designed and built a combined curb, gutter

which cost \$5.55 per lineal foot and has been in satisfactory operation for several months.



COMBINED CURB, GUTTER AND SEWER.

The structure consists of a channel under the gutter 24 inches wide and deep with concrete walks 8 inches thick and a concrete bottom 4 inches thick. One side is continued to

the sidewalk level and serves as a curb. The channel is covered with an iron plate 1½ inches thick, which rests on 1 x 2 x 3/16 angle irons set into the sides of the channel; this plate being flush with the roadway pavement and serving as the gutter. The outside bottom of this channel is just about level with the tops of the gas main and water main and is 18 inches above the sewer.

Concrete Poles for Wires

The Water Department of St. Louis, finding it necessary last year to replace some of the poles carrying the trolley wires of the water works railway, investigated the use of concrete poles, since poles of cedar or other wood were difficult to obtain and high in cost. It was found that the concrete would cost but little more than cedar, and forms were made and 37 poles cast and are now in service.

Freight on Road Materials

The United States Railroad Administration, under date of December 29, announced that "the 10-cent freight reduction on shipments of stone (broken, crushed and ground), slag, shells, chert, sand and gravel is extended to and including February 29, 1920."

The WEEK'S NEWS

Highway Progress in Oregon and Maine—U. S. Bureau of Education Disapproves School Closing in Epidemics—San Francisco Plans Purchase of Water System—Portland, Ore., Sues for Cost of Fighting Fire—Fire Department Unionism in Boston and San Francisco—Bond Defaults in Canadian Cities—New York Plans City Transit Ownership—Laboratory Tests for Auto Headlights in Pennsylvania.

ROADS AND PAVEMENTS

Oregon Spends \$7,000,000 On Highways.

Salem, Ore.—Expenditures under the supervision of the state highway department for the fiscal year ending November 30, 1919, totaled \$6,903,930.56, according to a statement issued by the department. The amount comprises expenditures of \$6,277,741.04 from state funds, \$325,050.01 from county funds and \$301,139.51 from federal funds. The expenditures do not cover the cost of all work completed during 1919, approximately \$1,000,000 payable to contractors being retained under a statute limiting payments on contracts to 85 per cent of the amount due until all work under the contracts is completed. The total expenditures are segregated as follows:

| | |
|--|----------------|
| On federal aid post roads..... | \$ 889,785.80 |
| On federal aid forest roads..... | 321,942.46 |
| On all other state highway construction..... | 4,915,229.11 |
| On maintenance work..... | 15,494.93 |
| On interest on bonds..... | 146,630.36 |
| On equipment..... | 214,045.84 |
| On survey and engineering county construction..... | 254,050.67 |
| On administration and general supervision..... | 146,753.39 |
| Total | \$6,903,930.56 |

Paving Contractors Win Claim Against City.

New York, N. Y.—A judgment of \$418,861.36 against the city of New York has been obtained by the Uvalde Asphalt Paving Company in the Supreme Court of New York county. The sum named in the judgment was the amount asked by the plaintiff as due it by reason of negligence on the part of the city in co-operating with the Uvalde Asphalt Paving Company in a paving contract. The Uvalde Company claimed that the city's failure to aid it resulted in two and a half years more work than was necessary on the contract. The trial lasted nearly three weeks. The city expects an appeal. The contract in question was one which involved \$1,049,609 expense to the city of New York in paving the Grand Concourse and Boulevard in the Bronx, a stretch of 4.1 miles, 182 feet wide. The work was started Oct. 2, 1902, and was wound up in November, 1909. This time included the delay of 2½ years, which the Uvalde Company claims was caused by the city's delay in letting contracts necessary to the work and in forcing the removal of railroad tracks barring the way.

\$4,000,000 for Maine Roads Next Year.

Augusta, Me.—Four million dollars for the construction of roads will be available next year in Maine. Half of this money will come from the state and the other half from the Federal Government, and it is expected that 150 miles of new state highways will be constructed. These new pieces of road will be so located that they will largely make connection between sections of state highways already completed. Labor will be the factor which will govern the amount of road work that will be done next year, and Paul D. Sargent, the chief engineer of the state highway commission, does not expect that wages of workmen will be any lower than during the present season, when men received from \$3 to \$4 a day, according to the locality. The experience of the highway department in hiring labor is that men who live near the cities, or rather where the work is nearer the cities, demand more pay than they do in the country districts. All of the work to be done next year will be federal aid jobs. Projects are being put into shape and presented to the federal government for ap-

proval as fast as possible, and the highway commission plans to let contracts at as early a date as the work is in condition to let. With this thought in mind, the highway commission early in September let a contract for 9.35 miles of bituminous macadam road in the town of Vassalboro, Kennebec County. The contractor has been able to lay practically all of his culverts this fall and do part of the heavy grading. Letting work early or in anticipation of next season's construction allows the contractors plenty of time to make all the arrangements for getting equipment on the job, for securing all necessary material and other details before the actual building begins. It is thought that this may tend to lower prices, as in many cases contractors can deliver and stack alongside the roads, gravel, stone and sand during the winter months when their teams otherwise would not be busy and when large loads can be hauled on wheels. Because of lack of funds, only 20½ miles of road were constructed during the present year. This work consisted entirely of finishing up contracts outstanding at the end of the year 1918.

SEWERAGE AND SANITATION

State University Gives Health Advice in Newspapers.

Chicago, Ill.—The department of hygiene and public health of the University of Illinois has inaugurated a press bulletin service whereby the larger newspapers of cities throughout the state will be supplied weekly with news stories and information articles pertaining to public health, hygiene and sanitation. This is announced to be part of the university's public health education work, the articles being contributed by members of the faculty who are authorities on their particular branches of health work. The initial bulletin contains three articles: One on warding off influenza by sterilizing eating utensils, one dealing with the care of the influenza patient, and one entitled "Poor vision a common cause of inefficiency." The articles are well written, the information is accurate, the advice serviceable, and altogether the service thus inaugurated is expected to be of considerable help in promoting health education of the people.

Value of Closing Schools During Epidemics.

Washington, D. C.—"Closing schools as a means of controlling epidemics of measles, whooping cough, scarlet fever, diphtheria, smallpox, and poliomyelitis should be considered as a last resort to be used only when thorough and systematic application of other measures fails to enact control. As a method it is clumsy, unscientific and unsatisfactory, for it fails to control and results in the loss of school time and money. The modern method of careful daily inspection of infected schools, isolation of sick children, and quarantine of contacts, is both more effective and economical." Such is the summary of a report made by a committee of the Bureau of Education co-operating with a similar committee of the American Public Health Association. This committee consisted of Dr. W. S. Small, Bureau of Education, chairman; Dr. W. C. Woodward, health officer, Boston; Dr. F. G. Curtis, health officer, Newton, Mass.; Dr. Bernard Kahn, acting director of medical inspection of public schools, Philadelphia; Dr. Taliaferro Clark, United States Public Health Service. The inquiry of the committee

developed that state laws show very few specific statutory references to the matter, rather general authority being vested in an administrative body. The review of literature showing that there has been a progressive abandonment of faith in, and practice of, closing schools as a means of controlling epidemics affecting school children. Such exceptions as were found in the literature related to the following special conditions: Inadequate medical supervision of schools; severity of epidemic that defies all efforts at control, and epidemics in which the etiology of the disease is unknown, such as infantile paralysis, epidemic meningitis and possibly a few others. The successful control of epidemic diseases among school children requires: 1. Keeping the schools open, with the possible exception of sparsely settled rural districts, when medical inspection can not be obtained and where the aggregation takes place only in the schools; 2. Careful daily or frequent periodical inspection of schools; 3. Careful provision for exclusion of cases and contacts, emphasis being placed on clinical data rather than upon fixed periods of exclusion; 4. Systematic home visitation; and 5. Reliance upon natural and physical cleansing rather than upon chemical disinfectants.

WATER SUPPLY

Water Rates Increased.

Davenport, Ia.—The city council has adopted a resolution authorizing the Davenport Water Co. to increase its rates as follows: Minimum rate, 70 cents per month for 2,000 gallons; \$8.40 per year for 24,000 gallons. For unmetered consumers, first 20,000 gallons in month, 35 cents per 1,000; over 20,000 gallons in month, 11 cents per 1,000. The present rate for minimum consumers is 60 cents a month or \$7.20 a year. For unmetered consumers, the first 20,000 gallons, 30 cents per 1,000; over 20,000 gallons, 10 cents per 1,000.

San Francisco Proposes to Buy Water System.

San Francisco, Cal.—Declaring the purchase by the city of the Spring Valley system to be the only sound procedure, from an engineering and economical standpoint, to serve San Francisco with water from Hetch-Hetchy, the special water committee of the Supervisors has presented its report at an informal meeting of the Board. In its report, which is concurred in by city attorney George Lull and the city engineer, the committee asks that it be directed by resolution of the Board to request the Railroad Commission to fix a fair and equitable price on such parts of the Spring Valley properties as the city may determine to be necessary in connection with supplying the city with water. The report also recommends that the Board agree by resolution to submit the proposition to the voters. While not urging undue haste, the committee suggests that a policy be decided upon as soon as possible, for the reason that Spring Valley has asked the Railroad Commission to increase its rates in order that it may build a \$12,000,000 pipe line and also because the city's water supply is at a dangerously low ebb. The report deals with engineering features, industrial and economical reasons, legal aspects and embodies the recommendation of the city engineer and a supplemental report on finance, dealing with revenues and the city's bonding capacity. After referring to the present critical condition of the water supply, the report says:

The amount of storage facilities within the city limits is inadequate to give the city safe protection against conflagrations or other catastrophes if, for any reason, the mains crossing the fault lines on the peninsula should be ruptured. These deficiencies can only be satisfactorily remedied if the city acquires, owns and operates its water supply as a whole and in conjunction with the great mountain supply from Hetch-Hetchy now under construction. The Hetch-Hetchy project now under construction terminates at the Amazon reservoir within the city limits. Either the city must make provision for the construction of an independent adequate distribution system, largely duplicating the existing system, in order to distribute Hetch-Hetchy water to its inhabitants, or it must acquire the distribution system of the Spring Valley Water Company, including the necessary local storage on the San Mateo peninsula. The former alternative from the standpoint of engineering and public economy is almost un-

thinkable, and, due to the fact that the company owns practically all the desirable peninsular storage sites, its adoption would enable the city to build the local storage necessary to adequately project its water supply going through a conduit 160 miles in length.

Pointing out the waste which would result from the construction of two costly pipe lines, the report says:

Within the last six weeks the company has filed a formal petition to the Railroad Commission, asking that these rates be increased by about 16 2-3 per cent, for the avowed purpose of enabling the company to finance the construction of a high-line conduit from Calaveras reservoir to San Francisco, costing approximately \$12,000,000, and to refund its bonded debt, which matures in 1923. The City Attorney has filed an answer to this petition, opposing any increase in the rates and opposing approval by the Commission of the construction of the proposed conduit line.

This opposition was based on the grounds that to build the proposed high-line conduit from Calaveras to San Francisco would involve the expenditure of \$12,000,000 upon which San Francisco's water rate payers must pay a return for a conduit which could never be used in connection with the Hetch-Hetchy project on account of the high elevation at which it is planned to be built. The latter fact, in turn, would necessitate a needless duplication of conduits in order to bring Hetch-Hetchy water into San Francisco.

It is pointed out that if the city continues its present Hetch-Hetchy construction and buys the Spring Valley properties, at the end of three years it may expect to be in a position to earn \$2,000,000 net revenue from the present Spring Valley sources and an additional \$2,500,000 to \$3,000,000 from the Hetch-Hetchy power development and the transbay water development.

FIRE AND POLICE

City Sues for Fire Fighting Cost.

Portland, Ore.—First proceedings under the personal liability ordinance passed a year ago at the instance of the fire department have been started by deputy city attorney Stanley Myers against Fink Brothers, coopers. Charging that the firm disregarded a specific warning on the part of the fire marshal and that a fire resulted, an effort will be made to force the company to pay to the city all costs connected with the services of the fire apparatus required to extinguish the blaze. This, it is understood, will amount to hundreds of dollars. The city charges that fire marshal Edward Grenfell served notice on the coo-perage plant by letter to abate fire risks on July 12, 1918. The points demanded were that the system of heating barrels be transferred to a fireproof room, that shavings be removed from the floors daily and that improvements be made in the heating system. No answer to this letter was received and it is charged that the conditions pointed out were not corrected. A fire occurred on December 2 of this year and the city is determined that inasmuch as this menace was specifically pointed out to the operators over a year ago they must pay for the use of the fire apparatus, firemen's wages and water consumed in extinguishing the blaze.

Boston Fire Officers Give Up Union.

Boston, Mass.—It is thought that the rank and file of the fire department will in the near future follow the example of their officers and surrender their charter of affiliation with the American Federation of Labor. There has been no announcement of such a purpose, but it is understood that a movement is under way. The Officers Club has voted 91 to 9 to surrender the charter, thus following the lead of their chiefs. This club has been affiliated with the International Association of Fire Fighters, which is also affiliated with the American Federation of Labor. There are 150 officers in the department, so that a large percentage of the members did not vote. The Russell Club had been for years a powerful political instrument in the hands of the Boston firemen before the labor union was established. Fire commissioners had confessed that its power was subversive of the best interests of the force, yet none of them saw fit to suppress it. The union was formed during the administration of mayor Curley and was regarded by city officials as the last step in organization development of city employees. The firemen realized that they did not have the support of the administration, but they did nothing to embarrass mayor Curley in his dominance of the

department. The first show of strength and determination under organization influence came in the campaign the firemen made in behalf of the ordinance establishing one day in three for time off. It was a campaign of irresistible effect on the city council. Despite the fact that fire commissioner John Grady was opposed to the change and that mayor Curley was also unfriendly, the firemen won. This was followed, more than a year ago, by the privates and the officers of the department joining hands in the effort to obtain from mayor Peters a large increase of salaries. The scale, affecting all groups, from the commissioner down, was handed to the mayor by the representatives of the two unions affiliated with the American Federation of Labor. It was presented mildly, yet insistently. Later conferences revealed the serious temper of the men. A strike was hinted for weeks and it was predicted that the weight of the American Federation of Labor was exerted in behalf of the firemen. When the Boston police deserted their posts labor leaders gave them the assurance that the firemen would strike in sympathy. Many conferences were held and strongest pressure brought to bear for a strike. While many powerful labor leaders advised such a course, others were opposed to it. The firemen remained on duty, but for days fire commissioner Murphy was busy in organizing a force to take the places of the firemen if they had followed the police. At the time the firemen organized assurances were given the city officials that, come what might, the organization would never vote to strike. But if the firemen would not strike to enforce their demands, union organization would be no more effectual than the old influence of the Russell club, a social organization. It has been reported that there was certain sentiment in the department for a withdrawal from the American Federation of Labor at this time, with the officers. Certain retarding influences have been at work, and progress delayed. Mayor Peters is anxious to see the fire department in a state of efficiency and esprit de corps like that of the old days under commissioner Russell. He feels that the morale had sunk to a low ebb when he came into office, and it was for that reason that he appointed John R. Murphy in the hope that a strong disciplinarian would bring the department back. Mr. Murphy is going ahead with his plans with painstaking care. Radical treatment may be necessary to fulfill the mayor's hopes. There may be retirements, promotions and transfers. The appointment of a new chief was the first step, and it has had an effect not lightly to be regarded.

Firemen's Union Forbidden.

San Francisco, Cal.—Fire commissioners have forbidden any member of the fire department to join a labor union or affiliate with any organized forces of labor which have the power to call a strike. The action was taken after a report from one of the commissioners that Eugene Muligan, a hoseman, had been seated in the San Francisco labor council as a delegate from the Fire Fighters' Union of San Francisco.

GOVERNMENT AND FINANCE

Investigate Canadian Cities' Bond Defaults.

Edmonton, Canada.—A judicial commission has been appointed by the Alberta Government to inquire into the affairs of the municipalities of that province which have defaulted their obligations. The municipality to be dealt with will be the town of Wetaskiwin, and it is felt that the proceedings of the commission in regard to Wetaskiwin will be of the utmost importance, inasmuch as any action taken in regard to its bonds will probably be adopted as a precedent to be followed, with the necessary variations due to local conditions, in the case of the other municipalities, to be dealt with later—Athabaska, Tofield and probably Macleod. The bondholders have already prepared memoranda to be placed before the commission, suggesting certain measures to be taken in the case of Wet-

askiwin. The principal recommendations made by the bondholders are as follows:

That taxes on improvements to be increased to 55 per cent of 65 per cent of their value, and that a petition be presented to the legislature to amend the charter of the town so as to enable it to assess improvements up to 75 per cent of their value.

That the business assessment is increased.

That the public utilities be put upon a paying basis; that is, that the rates charged for services be increased sufficiently to meet not only operating charges, but interest and other charges.

In the case of the waterworks, that the water rates be increased sufficiently to bring in a revenue, which could be applied to the reduction of the overdue interest payments.

That the debt to the local bank be funded.

That interest payments up to the end of 1919 be funded and spread over a term of ten years.

That in calculating the rate of taxation allowance be made for taxes that will not be collected.

It is generally felt that although the finances of the town are in very poor shape, the bondholders will not lose out in the end. The Municipal Finance Commission of Alberta is headed by Chief Justice Harvey, and its decisions become effective upon being approved by 60 per cent of the bondholders of any municipality whose affairs are investigated and after being passed upon by the Lieutenant-Governor in Council which means the Provincial Cabinet.

Light Sentence for Muncie Mayor.

Muncie, Ind.—Mayor Rollin H. Bunch has been sentenced to serve two years in the Atlanta prison and pay a fine of \$1,000 for participation in a fake prize fight scheme. Prosecuting attorney Murphy was given a similar sentence. Twenty-one others got varying prison terms and fines. They included well known Muncie men, members of the police force, and men from other cities.

TRAFFIC AND TRANSPORTATION

Plan City Ownership of Transit in New York.

New York, N. Y.—It is urged that the difficulties confronting the traction companies in the city because of lack of sufficient revenue will be immediately removed if they accept a plan worked out at five conferences of representatives of the companies, transit construction commissioner John H. Delaney and public service commissioner Lewis Nixon. The traction officials will submit the plan to the board of directors of the various companies as early as possible. The plan entails: (1) transfer to the city of all titles held by the companies in railroad properties; (2) guaranteed payment by the city of a reasonable rate of interest on fair appraisals; (3) setting aside of 1 per cent. for the purchase of the properties at the expiration of thirty-eight years; (4) a sufficient increase in fares to meet these requirements; (5) all else connected with the plan are matters of detail which it was agreed could be worked out if the companies agreed to relinquish control of their properties. Commissioner Delaney is author of the idea which is largely based on the city's municipal ownership plan and the need for getting possession of the railroads without the immediate payment of a large amount of money, which would be practically impossible because of the debt limit restrictions. Mr. Delaney stated that no proposal had been made by the companies, that what the city thought was the solution of the traction problem was set forth, and that if the concessions suggested were presented to the Board of Estimate they would have to be presented by the companies themselves. Mr. Delaney explained that one of the prerequisites for the solution of the transit problem was city ownership "of any and all such lines as the city may desire to acquire. Such lines will in any event include all of the rapid transit lines, both subway and elevated. Title to these properties must vest in the city at once. The matter of values must be agreed upon through negotiation before any municipalization project could become effective, and all existing leases, contracts and agreements for high rents and dividends must be abrogated, and only a fair interest return paid on such capital in the way of stocks and bonds as is proved to cover the fair value of the properties." Mr. Delaney explained

that the dual system contract points the way the city may acquire complete municipal ownership of all the rapid transit lines without overleaping the debt-incurring capacity of the city, and without violating restrictions placed upon the city in this respect by the state constitution. This contract permits the Interborough Rapid Transit Company to obtain possession of the partly completed Steinway tunnel and to assign it immediately to the city. "This principle," said Mr. Delaney, "could be applied to the acquirement by the city of the elevated railroads or any other transit property and complete municipal ownership be obtained on a basis which might be characterized as on credit terms, and full payment be spread over the period of amortization. Any contracts made on this basis should also secure to the city the privilege of taking possession at any time it saw fit by payment of the full purchase price agreed upon." Concerning the surface lines he said: "Representatives of these lines are asking the city to permit them to charge an eight, nine, or ten cent fare in order that owners of some of these lines may continue receiving as high as 18 per cent. dividends. Large amounts of money have been spent in improving these lines which will revert to the owners if these excessive payments are not continued. The lines are hiding behind a tangle of red tape. There is no doubt that the time has come when all of the wrongs committed against the interests of the people should be corrected." Under city ownership, Mr. Delaney said, the fare would be less because the city would not have to pay federal or state taxes on income, and that it would be relieved of other charges which now burden the railroads. It appears that the general plan for managing the roads, if the city takes them over, is to have the present companies operate them, to have a representative of the city on each directorate, and to run the lines generally on the existing plan plus the keeping up of the service to the highest point of efficiency which lack of money has not enabled the companies to do in the recent past.

City Completes Street Railway Company Valuation.

Houston, Tex.—The final valuation which the city will concede to the Houston Electric Company is \$5,110,771, according to the final figures arrived at by Lamar Lyndon, the city's rate expert. They were slightly lower than the estimated figure Mr. Lyndon gave before his departure for New York. Assuming a net valuation of \$5,000,000, Mr. Lyndon finds that \$622,075 net revenue will be required to bring the company a return of 8 per cent. and 4½ per cent. depreciation. He finds that by deducting the annual increase in real estate values, the net return for 1919 should be \$598,000. He says that under the circumstances, 7 to 7½ per cent. should be an ample net return on the value of the Houston property. Hence, the projected net return for 1919 is slightly in excess of the amount which "reasonable considerations" would dictate. Mr. Lyndon finds that the net income required for a 7½ return with 4½ per cent. depreciation is \$573,000, and for 7 per cent. is \$548,000. The engineer's original recommendations concerning net return and depreciation, the fare to be established, arrangement of a partnership between the city and company, modification of jitney competition, better traffic conditions and compulsory skip stops, stand without a change. Meanwhile the company is suing in Federal Court to have a valuation of its property made preliminary to determine what is a fair rate of return on the property.

Laboratory Tests for All Auto Headlights.

Harrisburg, Pa.—The state highway department has announced that certificates of approval of automobile headlight lenses and devices will be made only after laboratory tests of the lenses or devices. All lenses submitted for approval must undergo the laboratory test. Highway department inspectors, equipped with proper testing devices, will frequently be encountered on the highways of Pennsylvania by night travelers. These inspectors, however, will determine whether the headlights on an individual car, which appear to them to be producing glare in violation of the recent Act of Assembly, are really sending out improper candlepower to such an extent as to be a

LEGAL NOTES

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Injury to Tug by Drawbridge—Liability of City.

(U. S. D. C. Mass.) A city, as operator of a drawbridge, and a steamer, both held in fault and liable for injury to a tug assisting the steamer through; the steamer because of negligent operation of her engines contrary to signal, causing her to move ahead and strike the swinging draw, and the city because the bridge-tender negligently allowed the draw to overswing and strike the tug.—*New England Fuel & Transportation Co. v. City of Boston*, 257 F. 778.

Municipal Taxing Authorities—Interference by Courts.

(Ga.) Courts should not interfere with discretion of municipal taxing authorities, unless it appears that tax imposed for revenue is unreasonable in amount or discriminatory.—*Western Union Telegraph Co. v. City of Fitzgerald*, 100 S. E. 104.

Special Assessment—Construed in Favor of Owners.

(W. Va.) A statute purporting to impose liability upon one or more property owners to the relief of other taxpayers, by way of a special assessment for improvement or maintenance of a public road, street or alley, is to be construed strictly, and any doubt as to its scope will be resolved against the public and in favor of owners.—*Bonham v. City of Charleston*, 100 S. E. 222.

Paving Material Used by City—Payment.

(Cal. App.) City and county of San Francisco, having accepted, used, and retained pavement material which the board of supervisors had the general power to authorize board of public works to purchase, could not refuse to pay for it upon ground that certain provisions of the charter or ordinances were not strictly complied with.—*Warren Bros. Co. v. Boyle*, 183 P. 706.

Sidewalk Construction Contract Not Negotiable.

(Ind. App.) Sidewalk construction contract is not a negotiable instrument.—*State v. Aubrey*, 124 N. E. 278.

Street Cleaning and Garbage Collection Contract—Retention of Money by City.

(Mass.) Where the city of Boston contracted for the collection of ashes, removal of snow, street cleaning, etc., the contract providing for the retention of money by the city to settle claims for materials or labor furnished in carrying on the contract, but not for services connected with the work, because the city retained money beyond what was necessary for its own protection under such clause of the contract, there arose no implied common-law equitable lien for the payment of claimants who furnished the contractor single and double teams with or without extra men, and carts without either horses or men; the charge in each instance being for a single sum for hire of one single team, or one double team, or one double team and two helpers, such contract not being "for materials or labor furnished."—*Loonie v. Wilson*, 124 N. E. 272.

menace. By means of what is known as a photometer the inspector can obtain a quantitative confirmation of his opinion. If results show that the offense is flagrant the department will be able to proceed with more definiteness than would be possible if the degree of the offense were to be obtained only by unaided vision. The inspector, in other words, will make the road inspection to see whether proper lenses or diffusing devices are used; and if so whether the car owner is using bulbs below or above requirements. Road tests for the approval of lenses are deemed impracticable because conditions, to be fair to all lenses, should be comparable in every way with conditions existing in the laboratory—which would include proper focusing in accordance with specifications accompanying the headlight device; burning of the lamps under constant current conditions, giving definite candlepower; and the use of meters or photometers of accuracy corresponding to laboratory instruments.

NEWS OF THE SOCIETIES

Jan. 14.—NEW ENGLAND WATER WORKS ASSOCIATION. Annual meeting, Hotel Brunswick, Boston, Mass. Secretary, Willard Kent, Narragansett Pier, R. I.

Jan. 16, 17.—WESTERN PAVING BRICK MANUFACTURERS' ASSOCIATION. Annual meeting, Kansas City, Mo. Secretary, G. W. Thurston, 416 Dwight Bldg., Kansas City, Mo.

Jan. 19.—AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Annual meeting, New York City. Secretary, F. A. Molitor, 35 Nassau street, New York City.

Jan. 21, 22.—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual meeting, New York City. Secretary, Charles W. Hunt, 33 West 39th street, New York City.

Jan. 28.—WESTERN SOCIETY OF ENGINEERS. Annual meeting, Chicago, Ill. Secretary, Edgar S. Nethercut, 1735 Monadnock Block, Chicago, Ill.

Feb. 9-13.—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

Feb. 16-18.—INTERNATIONAL CITIES AND TOWN PLANNING ASSOCIATION. Annual meeting, London, England. Honorary secretary, C. B. Purdon, 3 Grays Inn Place, London, W. C., England.

Feb. 20-21.—AMERICAN CONCRETE PIPE ASSOCIATION. Annual meeting, Chicago, Ill. Secretary, G. E. Warren, 210 South LaSalle street, Chicago, Ill.

May 18-21.—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting secretary, S. A. Sewall, 29 West 39th street, New York City.

June 21-25.—AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Montreal, Canada. Secretary, John M. Diven, 153 West 71st street, New York City.

Society for Electrical Development.

At a recent meeting of the Board of Directors of the Society for Electrical Development held at the society's offices, in the Engineering Societies building, New York, W. W. Freeman was unanimously elected president of the organization, succeeding Henry L. Doherty, who has held that office since the founding of the society nearly six years ago.

As president of the Union Gas & Electric Co. of Cincinnati, Mr. Freeman is well known to all branches of the electrical industry. Being vice-chairman of the Public Policy Committee of the National Electric Light Association, of which committee Mr. Freeman was chairman for a number of years, the new president brings to the society a broad experience in dealing with matters pertaining to the relations between the great electricity consuming public and the people who produce and market the energy and devices through which it is used.

Under his leadership the society will continue its excellent work of coordinating and assisting all branches of the electrical industry to bigger and better business as well as carrying to the public the message "Do It Electrically."

Under the guidance of Mr. Doherty, its past president, the society has done a big work in getting the various branches of the industry together.

At a meeting of Advertising and Publicity Service Bureau of the Com-

mercial Section of the National Electric Light Association, held recently in Chicago, steps were taken to cooperate with the Society for Electrical Development to eliminate duplication of work and to further develop publicity.

New England Water Works Association.

The annual meeting of the New England Water Works Association will be held at the Hotel Brunswick, Copley Square, Boston, on Wednesday, Jan. 14. Following a meeting of the executive committee in the morning and a lunch at 1 p. m., the following committee chairmen will report on the work of their committees:

Standards of Purity for Water, Mayo Tolman; To Consider Collections and Standardization of Rainfall and Run-off Measurements, William T. Barnes; Revision of Constitution and By-Laws, Henry V. Macksey; Standard Specifications for Cast Iron Pipe and Special Castings, Frank A. McInnes; Uniform Accounting, Albert L. Sawyer; Standard Specifications for Fire Hydrants, H. O. Lacount; Revenue from Fire Service, William C. Hawley; Statistics of Water Purification Plants, George C. Whipple; Leakage of Pipe Joints, F. A. Barbour; Standard Specifications for Water Meters, Charles W. Sherman; Proposed Standard Schedule for Grad-

ing Cities and Towns of United States with Reference to their Fire Defenses and Physical Conditions, Frank A. McInnes; A National Water Law, Caleb M. Saville; Extension of Mains, Caleb M. Saville; National Department of Public Works, Henry V. Macksey.

Reports will then be read by the secretary, the treasurer, the editor and the auditors. Samuel E. Killam will deliver his presidential address. Election of officers will follow.

American Association of Engineers.

The results of the membership drive held during December by the American Association of Engineers have been finally tabulated. Buffalo Chapter won first prize for clubs having a membership of more than 100, with an increase of 318.4 per cent. For the chapter or club having less than 100 members at the close of the drive, the Ogden (Utah) Club won first place, with an increase of 209.9 per cent. The prize won by the Buffalo Chapter is a silk banner specially designed and indicating that Buffalo is the banner chapter of the association for 1919. A special gavel for chapter use was awarded to the Ogden club. The three members of the association obtaining the highest number of individual subscriptions were F. P. Obee, an engineer of Toledo, Ohio; J. W. Shera of Chicago, and Professor Samuel M. P. Dolan of the Oregon State College, who turned in respectively, 131, 100 and 66 applications for membership. The

(Continued on page 18)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

SEWERAGE IMPROVEMENTS are to be made by Chandler, Okla., for which plans are being revised by the consulting engineers, V. V. Long & Co.

Plans are being prepared for PAVING, SEWERAGE and WATER IMPROVEMENTS in Haddonfield, N. J., by the consulting engineers, Remington & Vosbury.

WATER WORKS IMPROVEMENTS, including new water supply from Hill Creek and water works extension, are planned by Madill, Okla., to cost \$400,000. The consulting engineers are Johnson & Benham.

Woodstock, Ont., Board of Health plans to make SEWERAGE IMPROVEMENTS, involving 2½ miles 30-inch reinforced concrete pipe and concrete sewage disposal plant, to cost \$93,000. Plans are being prepared by the consulting engineers, F. J. Wire & Son.

Napanee, Ont., plans extension to WATER WORKS SYSTEM, including four miles 6-inch cast iron pipe to cost \$50,000 and filters and pumps, \$30,000. The town has retained E. A. James Co., Ltd., consulting engineers, to advise what additions should be made to system, should town decide to purchase it.

Leighton, Pa., plans improvements of WATER WORKS SYSTEM. The consulting engineers are Gannet, Seelye & Fleming.

Macon, Ga., is planning extensive WATER WORKS IMPROVEMENTS at pumping station, including the construction of a high levee around property. The consulting engineer is Geo. W. Fuller.

Benson, Minn., is having plans prepared to build a combined SEWERAGE SYSTEM to cost \$80,000. The consulting engineers are the Bradley Engineering Service.

Enterprise, Ore., will vote on \$50,000 additional bonds for PAVING IMPROVEMENTS, involving the paving of 35 blocks with concrete, asphaltic concrete or bitulithic. The consulting engineer is L. C. Kelsey.

Marathon county, Ballinger, Tex., plans to build a BRIDGE over Colorado river, including removing present structure and addition to present substructure. The bridge will be 518 feet long, reinforced concrete and steel girder, and will cost about \$39,986. Plans are being prepared by the consulting engineers, Hess & Skinner.

INDUSTRIAL NEWS

The New York Continental Jewell Filtration Co., Nutley, N. J., announces that Arthur M. Crane has been appointed general manager, succeeding the late Robert E. Milligan. Mr. Crane was formerly general sales manager. D. C. Williamson continues as chief engineer. Mr. Williamson has been responsible for the design of plants and apparatus for nearly twenty years. E. K. Sorenson remains secretary and assistant treasurer. Messrs. Crane, Williamson and Sorenson are also directors of the company. The company is prepared, as heretofore, to assume the entire responsibility of designing and building complete plants, guaranteed to produce results in filtration, softening, iron removal, or other rectification of water; or to bid on plans and specifications of other engineers. It maintains a western office in Chicago and competent representation elsewhere throughout the world; but municipal filtration projects are handled direct from the general offices and works at Nutley, N. J.

Predicts Cord Tires Will Lead.

That solid tires for motor trucks will be obsolete within three years, street cars will soon be replaced by motor busses and freight cars given close competition by motor trucks on long hauls, were the predictions made by F. A. Seiberling, president of the Goodyear Tire & Rubber Company, and P. W. Litchfield, factory manager, at a banquet given the Detroit and Cleveland sections of the Society of Automotive Engineers in Akron recently.

More than 200 of the foremost designers heard Mr. Seiberling's prophecy that within the lifetime of those present, the United States would be criss-crossed by great highways of solid foundation to withstand any wear and that highways of less than 16 feet width would be unknown. He asserted that the ultimate tire would be the cord—that there would be no fabric or solid tires.

China as the future big market for tires was advocated by the speaker, who declared that the numerous post roads of stone would be excellent foundations for modern highways through that part of the Orient. He quoted statistics to show that 50 per cent of China's four million people are employed in transportation against 10 per cent in the United States, and predicted a Celestial kingdom of motor transportation. Railroads cannot be built because of violating Chinese traditions in crossing burial places with the right of way.

Mr. Litchfield declared that the trolley must go, stating that it has reached a point where it cannot compete with the motor bus. For financial reasons extensions are impossible, so the street car must give way to the gas-driven

vehicle that can aid development of suburbs without heavy investment in franchises and equipment.

Increase in traffic has sounded the death-knell of the trolley, according to Mr. Litchfield. Streets cannot easily be widened to give more track room. Continuous traffic movement is imperative. Therefore the whole street service must be utilized by a carrier that can go to the curb to take on or discharge passengers—the trolley must go underground as in London—if it remains in existence.

The Goodyear factory manager pointed out the immobility of freight cars and delays necessitated in waiting to make up trains for given destinations. In contradistinction he indicated the mobility of the motor truck and predicted that with permanent highways and cord tire equipment, the motor truck will replace the freight car on long hauls.

Mr. Litchfield asserted that the world war had put Europe 50 years ahead in transportation and with this future for the industry in mind asked the visiting engineers to design large capacity carriers to replace the street car and prophesied a multiple-wheeled truck would give competition to the railroads on long hauls.

Tests and Investigations by Bureau of Standards.

Among the recent investigations by the Bureau of Standards of the Department of Commerce were tests on frost action and fire tests of concrete columns.

Freezing tests were made by the Bureau on 15 samples of commercial sandstone. Several of these withstood 300 freezings with but few signs of disintegration, while the poorer grades were completely broken down by less than 100 freezings. One sample of granite passed 300 freezings without showing any signs of frost action, while a sample of porous limestone began to disintegrate at 150 freezings.

Twenty-eight full size columns of reinforced concrete have been constructed; 25 have been subjected to the combined fire and load test, and 7 have been tested cold, in compression. The work done has been two-fold in nature, and consists, first, of making and testing full size building columns of reinforced concrete from aggregates not previously included; and, second, in making and testing columns with protective material other than concrete. It has been found that columns made from the so-called Cow Bay gravel, a mixed gravel containing a large proportion of granite and gneiss pebbles, and columns made from pure quartz gravel gave results not quite so good as the columns made from Pittsburgh gravel previously tested. In the later column tests, the protective concrete spalled so badly early in the fire test, that a large part of the protective covering, after breaking up into slabs, fell away from the column exposing the

steel and the load-bearing concrete to the fire. These columns failed under their working load before the completion of the 4-hour fire test. On the other hand, columns in which the coarse aggregate was trap rock showed no tendency to spall or crack seriously in the fire tests, and retained more than mined by load tests made while the columns were at maximum temperatures at the end of the 4-hour fire test. The results shown by columns in which the coarse aggregate was blast furnace slag were similar to those with trap rock aggregate.

NEWS OF THE SOCIETIES

(Continued from page 17)

prizes awarded these three gentlemen are life membership in the association, a \$100 set of books and a \$50 watch.

The captain of the membership team bringing in the greatest number of members on the Buffalo Chapter was F. A. Eschrich of Buffalo. T. M. Burlingame was drive commander for the Buffalo Chapter, and W. F. Turner acted a similar capacity for the Ogden club.

The chapters who stood after the Buffalo Chapter were Lincoln, Nebraska, with 310 per cent; the University of Nebraska, with 301.9 per cent, and the Toledo Chapter with 194 per cent. The largest number of applicants obtained during the drive was 474, obtained by the Chicago Chapter. Of this number, 100 were obtained by one man. The second largest chapter in point of number of applications was the Oregon Chapter, with 353. The number of applications obtained by the Buffalo Chapter was 242. It is interesting to note that the Lincoln Chapter and the University of Nebraska Chapter are located in the same city and that had they been consolidated, the chapter would have won first place.

The captain of the team in each chapter and club which obtained the most applications will receive a solid gold watch fob.

The membership of the American Association of Engineers, at the close of business on December 31 was in excess of 10,400, and the determination of the association to obtain 10,000 members before 1920 has been achieved with a large margin to spare. There were almost 7,000 applications for membership received in the month of December.

The recommendations for salaries for state highway engineers, prepared by the committee of the American Association on Salaries of Engineers in Public Service, which were endorsed by the American Association of State Highway Officials in December and by the meeting of the American Road Builders' Association, have been formally approved by the Executive Committee of the American Association of Engineers. Active steps to have this schedule placed in effect will be inaugurated early in 1920.